

Remarks/Arguments:

Summary of Changes Made

By this Amendment, claims 1, 4, 8, 10, 12 and 14 have been amended, claims 2, 3 and 5-7 have been canceled and new claims 19-24 have been added to the application. Thus, claims 1, 4 and 8-24 are pending in the application. No new matter has been added to the application.

Double Patenting

In the prior Office Action, the Examiner objected to claim 5 under 37 C.F.R. §1.75 as being a substantial duplicate of claim 2. By this Amendment, claim 5 has been canceled.

Claim Rejections - 35 U.S.C. §102

Also in the prior Office Action, the Examiner rejected claims 1-3, 5-6 and 8-18 under 35 U.S.C. §102(e) as being anticipated by Hardy et al., U.S. Pat. No. 6,238,592. By this Amendment, applicants have amended claims 1, 8, 10, 12 and 14 to specify that the chemical-mechanical polishing slurry used in the method of the invention is the same as the chemical-mechanical polishing slurry claimed in the parent application, namely Application Ser. No. 09/692,730, now U.S. Pat. No. 6,702,954.

Hardy et al. teaches at col. 9, lines 28-52 that:

Buffers may be added to the working liquid to control the pH and thus mitigate pH changes caused by minor dilution from rinse water and/or the difference in the pH of the deionized water depending on the source. As mentioned above, the pH can have a significant effect on the nature of the copper surface, and the copper removal rate. The most preferred

buffers are compatible with semiconductor, post-CMP cleaning needs as well as having reduced potential impurities such as alkali metals. In addition, the most preferred buffers can be adjusted to span the pH range from acidic to near-neutral to basic. Polyprotic acids act as buffers, and when fully or partially neutralized with ammonium hydroxide to make ammonium salts, they are preferred. Representative examples including systems of phosphoric acid-ammonium phosphate; ammonium hydrogen phosphate; polyphosphoric acid-ammonium polyphosphate; boric acid-ammonium tetraborate; boric acid-ammonium pentaborate. Other tri- and polyprotic protolytes and their salts, especially ammonium salts are preferred. These may include ammonium ion buffer systems based on the following protolytes, all of which have at least one pKa greater than 7: aspartic acid, glutamic acid, histidine, lysine, arginine, ornithine, cysteine, tyrosine, and carnosine.

Applicants note that the foregoing teachings set forth in Hardy et al. are nearly identical to the teachings set forth at col. 14, line 40-62 of Kaisaki et al., U.S. Pat. No. 6,194,317, as follows:

Buffers may be added to the working liquid to control the pH and thus mitigate pH changes from minor dilution from rinse water and/or difference in the pH of the deionized water depending on the source. As mentioned above, the pH can have a significant effect on the nature of the copper surface, and the copper removal rate. The most preferred buffers are compatible with semiconductor, post-CMP cleaning needs as well as having reduced potential impurities such as alkali metals. In addition, the most preferred buffers can be adjusted to span the pH range from acidic to near-neutral to basic. Polyprotic acids act as buffers, and when fully or partially neutralized with ammonium hydroxide to make ammonium salts, they are preferred representative examples including systems of phosphoric acid-ammonium phosphate; polyphosphoric acid-ammonium polyphosphate; the boric acid-ammonium tetraborate; boric acid-ammonium pentaborate.

Other tri- and polyprotic [sic] protolytes and their salts, especially ammonium salts are preferred. These may include ammonium ion buffer systems based on the following protolytes, all of which have at least one pKa greater than 7: aspartic acid, glutamic acid, histidine, lysine, arginine, ornithine, cysteine, tyrosine, and carnosine.

The Examiner may recall that the Board of Patent Appeals and Interferences issued a Decision during prosecution of the parent application holding that the Examiner's rejection of claims directed to the chemical-mechanical polishing slurry as being unpatentable over Kaisaki et al. in view of Grumbine et al., U.S. No. 6,136,711 could not be sustained. Applicants respectfully submit that since the composition claims are patentable over the teachings of Kaisaki et al., and since the relevant teachings of Kaisaki et al. are substantially identical to the applied teachings of Hardy et al., then applicants' claims directed to a method of polishing using the claimed composition must also be patentable over Hardy et al. In view of the foregoing, applicant respectfully requests reconsideration of the prior rejection of claims 1 and 8-18.

Claim Rejections - 35 U.S.C. §103

Finally, in the prior Office Action, the Examiner rejected claims 4 and 7 under 35 U.S.C. §103(a) as being unpatentable over Hardy et al. in view of Grumbine et al. Applicants note that claim 7 has been canceled by this Amendment thereby rendering the prior rejection thereof moot. Claim 4 has been amended to depend from claim 1 rather than claim 2, and claims a method that involves use of a chemical-mechanical polishing slurry having the same scope as claim 2 of the parent application. Applicants respectfully submit that claim 4 is patentable over the applied references for the same reason that the chemical-mechanical polishing slurry used in the method was patentable over the applied references (applicants contend that Hardy et al. is equivalent, in terms of relevant teaching, to Kaisaki et al.).

New Claims

By this Amendment, applicants have added new claims 19-24 to the application to round out applicants' claim coverage. New claims 19-24 clearly add no new subject matter to the application and claim specific methods of removing barrier layers of tantalum and/or tantalum nitride and titanium and/or titanium nitride, respectively.

Conclusion

In view of the foregoing, claims 1, 4 and 8-24 are believed to be in condition for allowance. The issuance of a timely Notice of Allowance is therefore respectfully requested.

Respectfully submitted,

RANKIN, HILL, PORTER & CLARK, L.L.P.

A handwritten signature in black ink, appearing to read "R. E. Digges", is written over a horizontal line.

Randolph E. Digges, III
Reg. No. 40,590

925 Euclid Avenue
Suite 700
Cleveland, Ohio 44115-1405
(216) 566-9700